# Monitoring by Citizens and Its Impact on the Air Quality Community and AIRNow

Timothy S. Dye and Paul T. Roberts
Sonoma Technology, Inc.
Petaluma, CA

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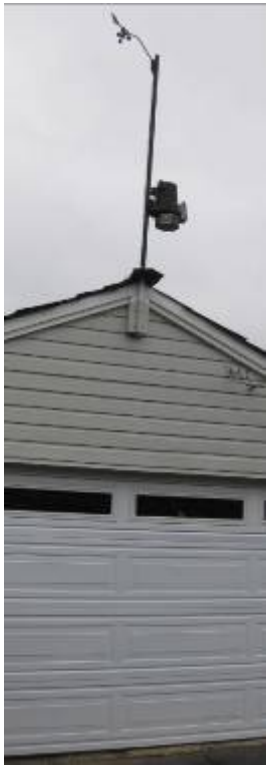
Sonoma Technology, Inc.
Air Quality Research and Innovative Solutions

# What Is “Monitoring by Citizens”?

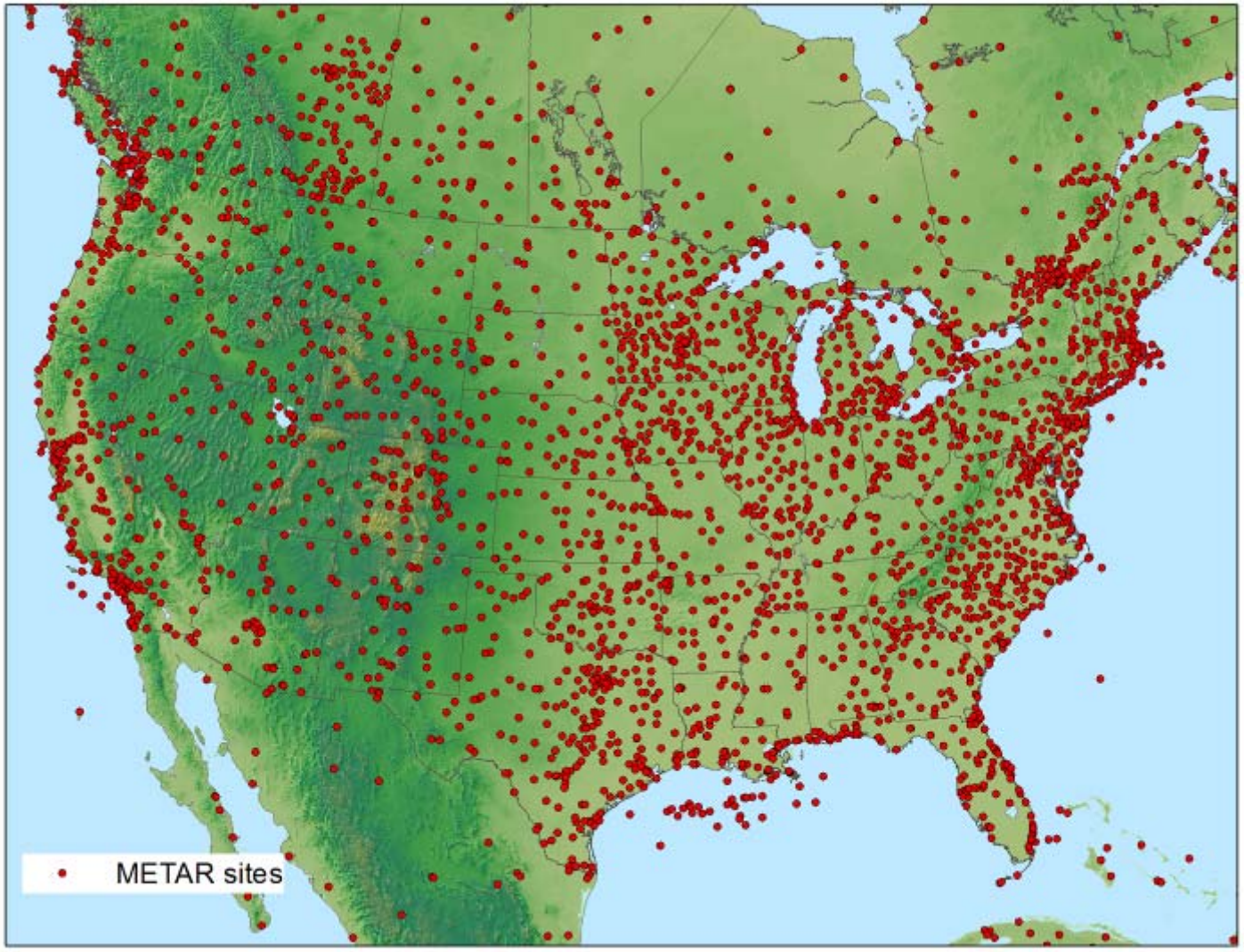
- Citizen science
- Measurements made by
  - Citizens
  - Non-government organizations
  - Fixed locations or moving platforms
- Examples
  - Bucket Brigade (toxics monitoring)
  - Citizen Weather Observer Pgm.
- Technology is key
  - Monitor cost and size
  - Internet telemetry and reporting



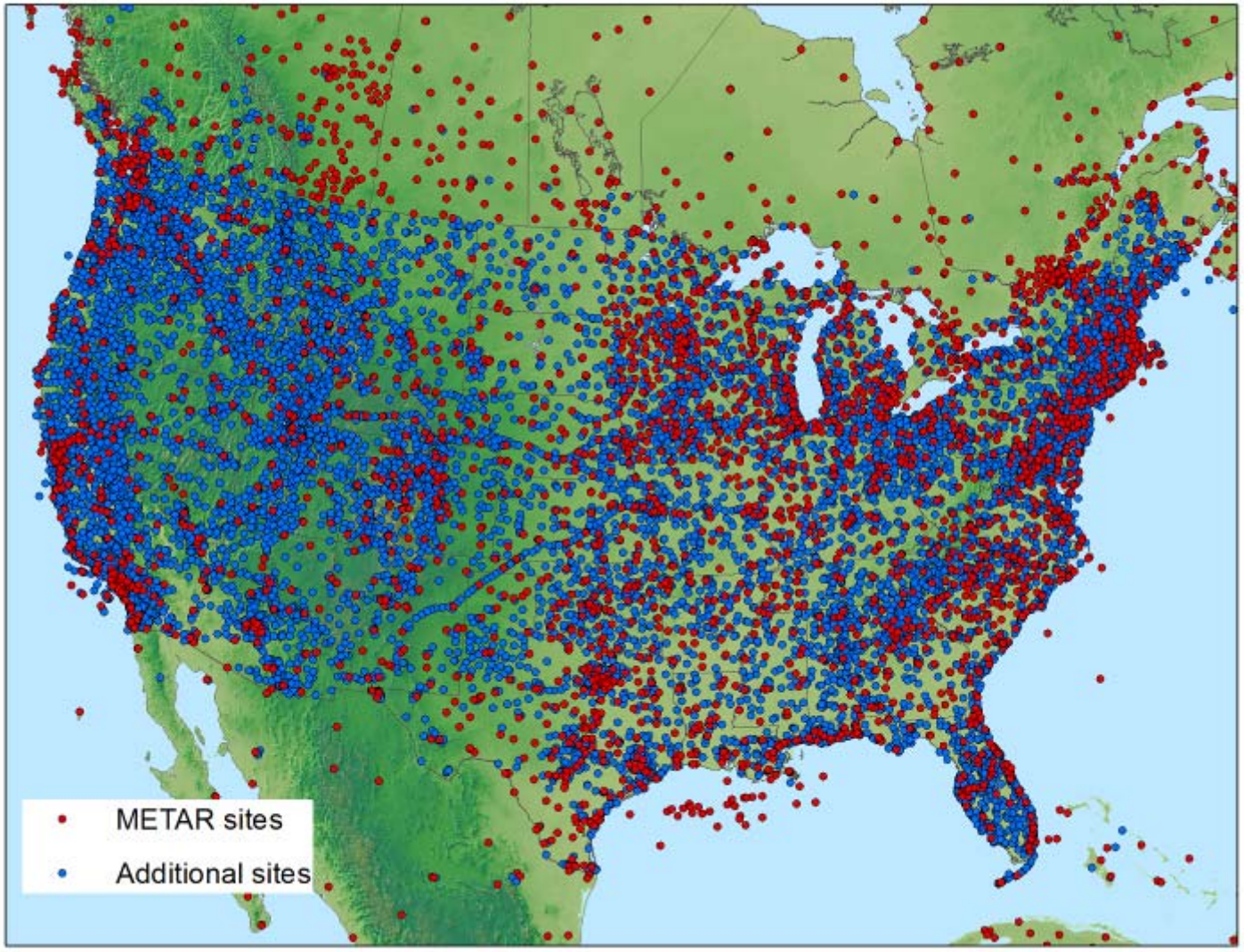
# Purpose of Presentation

- Inform about recent trends in AQ monitoring
- Begin discussion about
  - Understanding citizen monitoring
  - Evaluating implications of citizen monitoring
  - Determining agency interests/concerns
  - Creating a community of
    - Public agencies
    - Citizens and NGOs
    - Private sector companies
  - Establishing a Citizen Environmental Monitoring Corps?

# Impact of Citizen Monitoring on the Weather Community (1 of 2)



# Impact of Citizen Monitoring on the Weather Community (2 of 2)

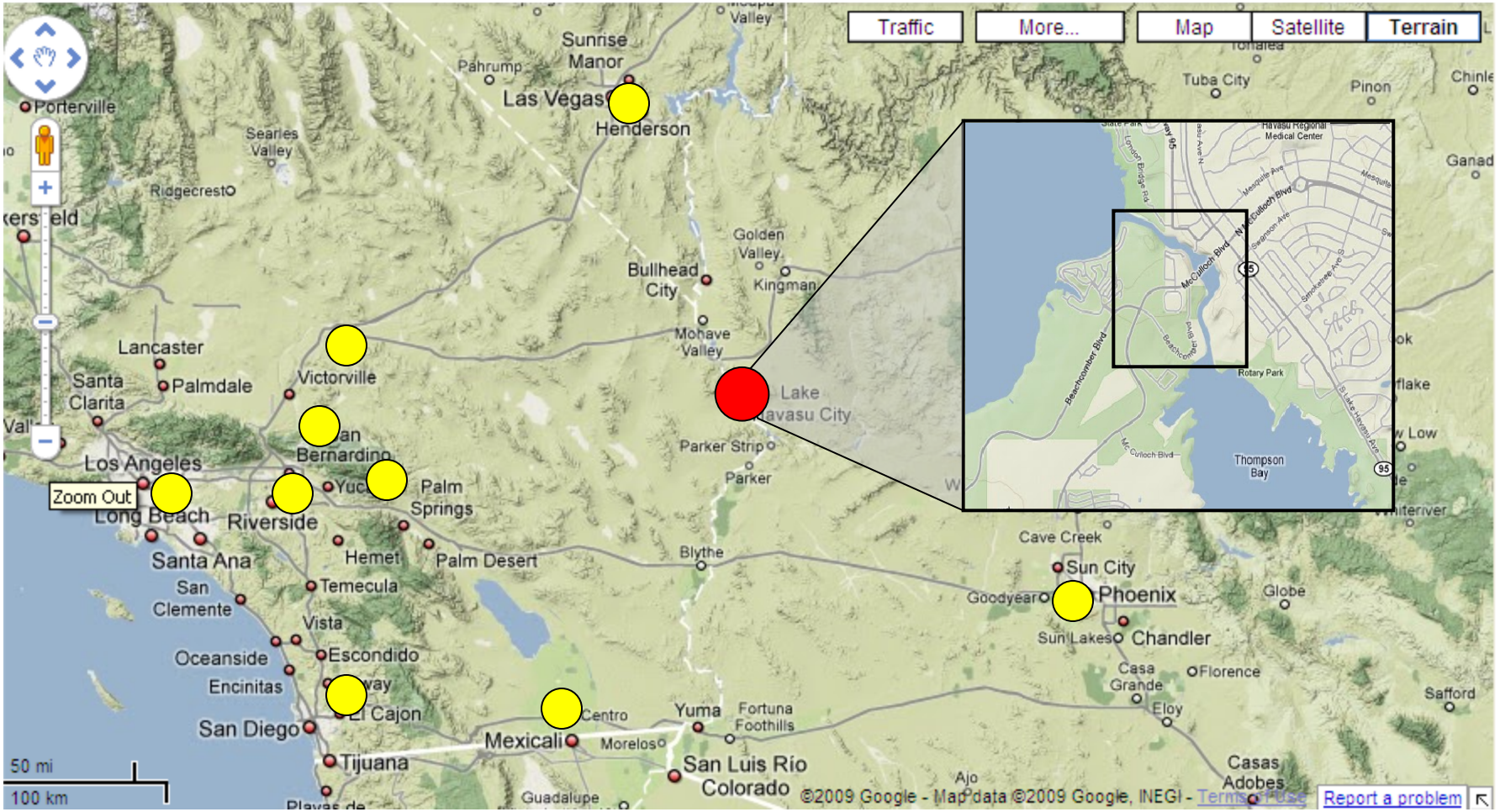



Source: NOAA MADIS

# Example – Carbon Monoxide (Lake Havasu City) (1 of 3)

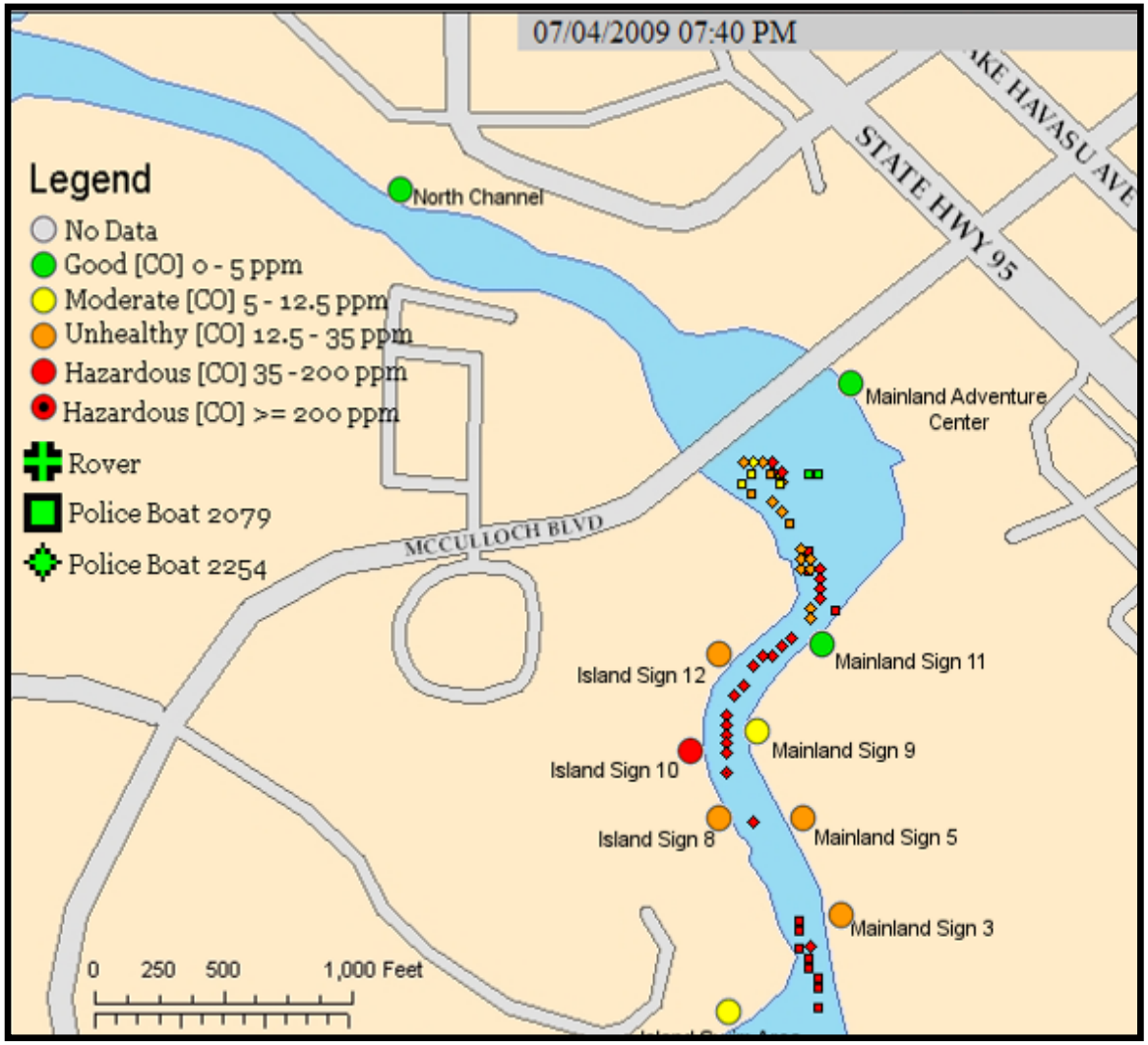
- Group
  - Lake Havasu City
  - Sonoma Technology, Inc.
- Measurement
  - CO (fixed land sites)
  - CO (mobile – boat)
- Instrument
  - AreaRAE CO monitor

# Example – Carbon Monoxide (Lake Havasu City) (2 of 3)




= Nearest CO monitor  = Study region

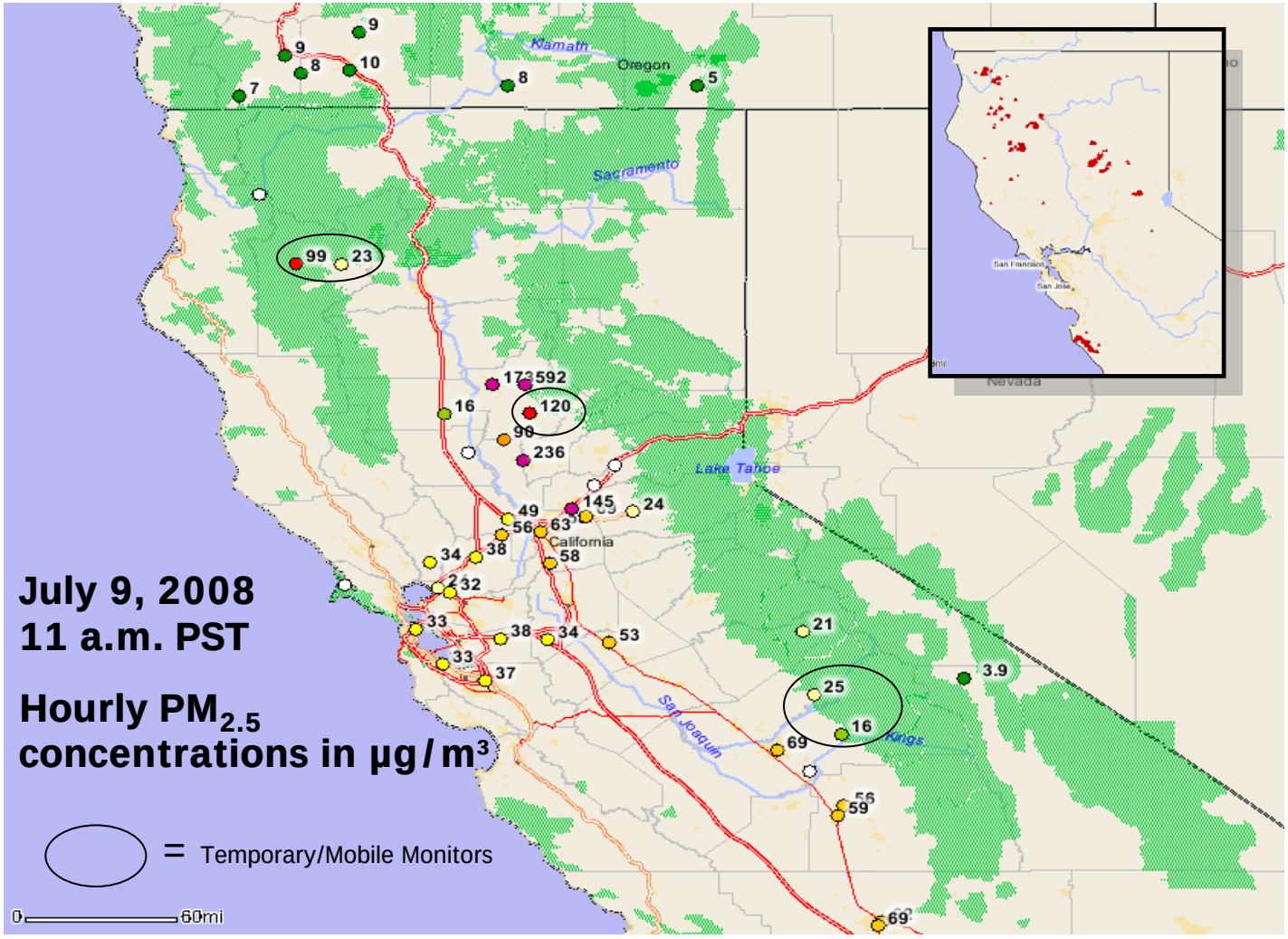
# Example – Carbon Monoxide (Lake Havasu City) (3 of 3)




# Example – EBAM (1 of 2)

- Groups
  - U.S. EPA
  - California Air Resources Board
  - U.S. Forest Service
- Measurements
  - $PM_{2.5}$ or $PM_{10}$
  - Temp., relativity humidity, winds
- Instruments
  - EBAM
  - Satellite/cell modem

# Example – EBAM (2 of 2)




Source: AIRNow-Tech

# Example – Black Carbon (1 of 2)

- Group:  Magee Scientific
- Measurement:  Black Carbon (BC)
  - BC is about 5% of total $PM_{2.5}$
  - Sources:  combustion, especially diesel vehicles
- Instrument
  - Aethalometer™
  - Optical absorption method (filter strips)

Source:  Tim Morphy, Magee Scientific

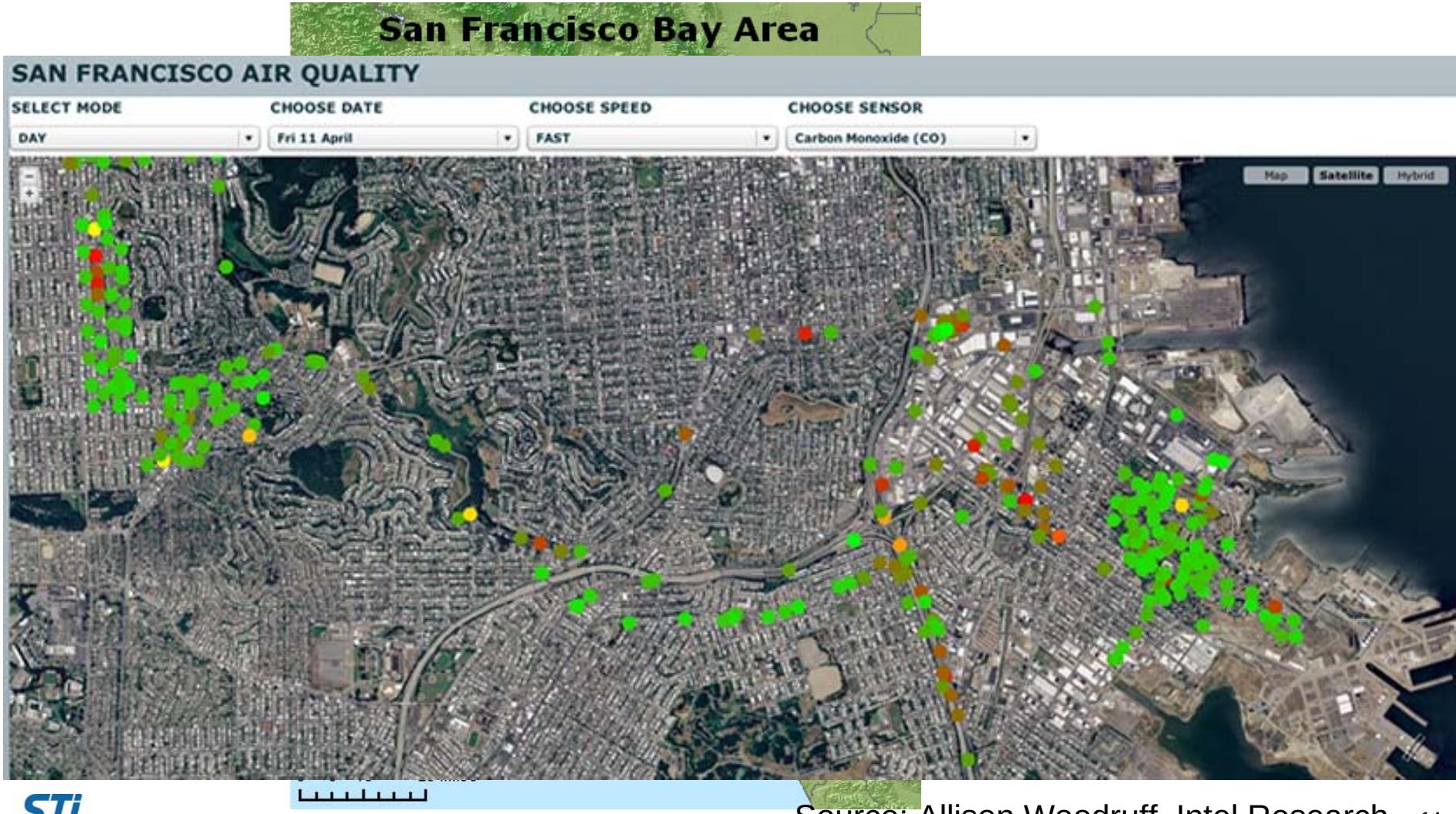
# Example – Black Carbon (2 of 2)

# Example – Carbon Monoxide (San Francisco) (1 of 2)

- Group:  Intel Research
- Measurements
  - CO, $O_3$, $NO_2$
  - Temp. and relative humidity
  - Location and light
- Instrument
  - Cell phone size
  - Solid state sensors
- Testing on street sweepers in San Francisco

Source: Allison Woodruff, Intel Research

# Example – Carbon Monoxide (San Francisco) (2 of 2)

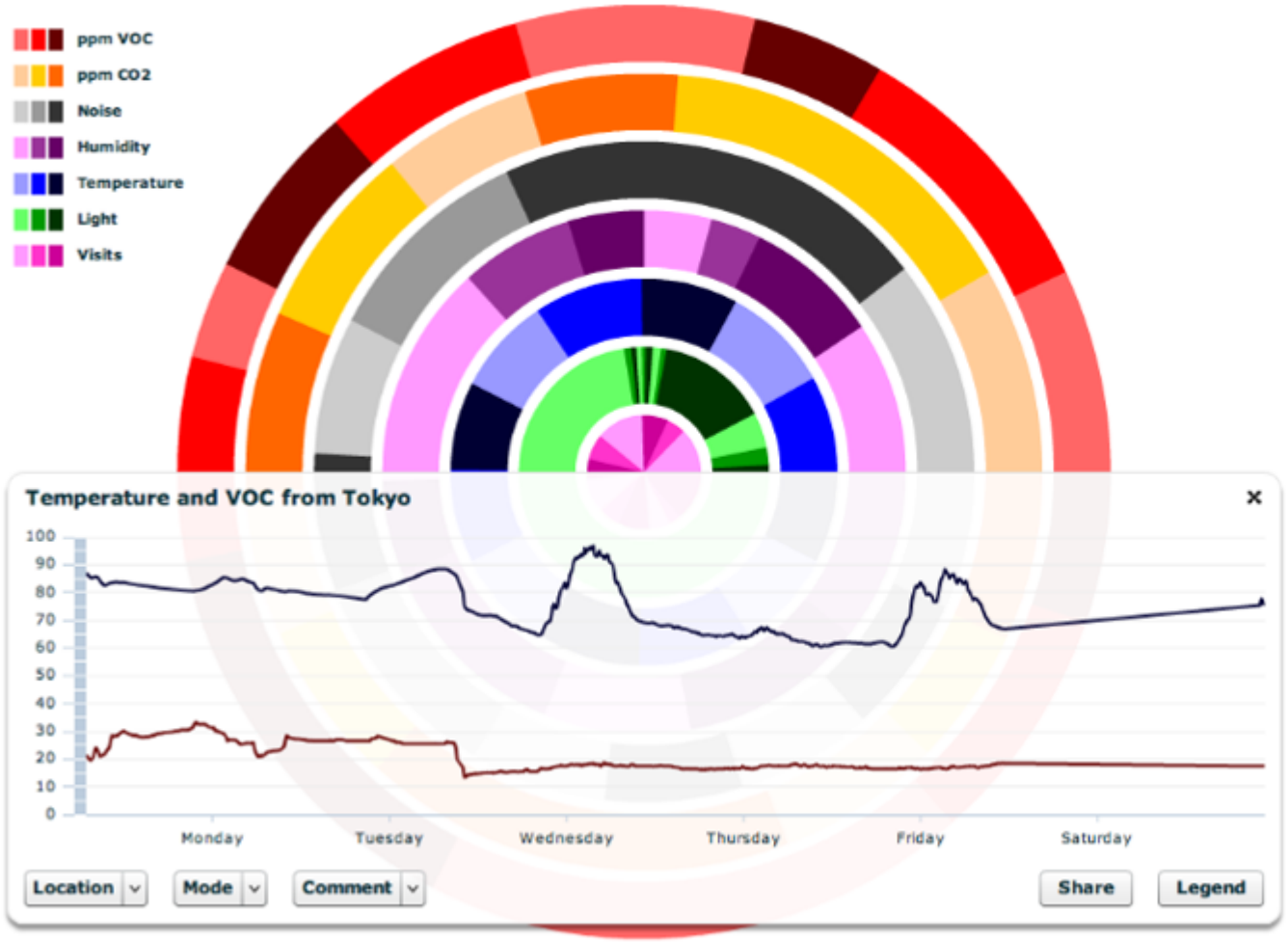



Source: Allison Woodruff, Intel Research

# Example – $CO_2$ and VOCs (1 of 2)

- Groups: Aclima
  U.C. Berkeley
- Measurements
  - $CO_2$ and VOCs
  - Temp. and relative humidity
  - Location, sound, and light
- Instrument
  - Real-time feedback (LEDs)
  - Solid state sensors
  - Internet
  - Community

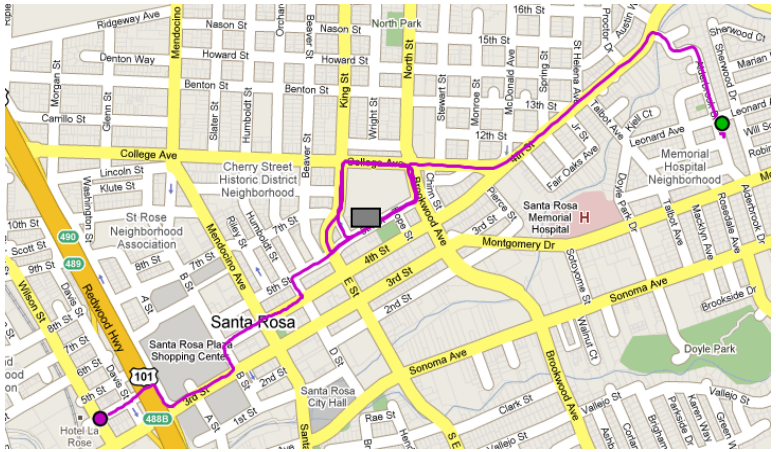

# Example – $CO_2$ and VOCs (2 of 2)



# Issues to Consider (1 of 2)

Data quality – function of application

- Directional response
- Response on short time scales
- Long term repeatability

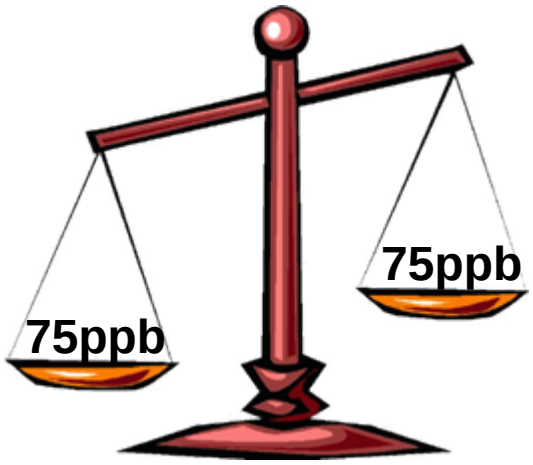



Representativeness

- Spatial scales
- Temporal scales
- Mobile – sampling different environments
- Indoors vs. outdoors

# Issues to Consider (2 of 2)

- Ownership
  - Distribution
  - Attribution
- Advocacy
- Increased coordination
  - EPA staff
  - State/local staff



# Citizen Environmental Monitoring Corps

- Empower citizens to make air quality measurements
- Educate and certify
  - Air Quality 101
  - Monitoring principles
  - Quality assurance
- Integrate with AIRNow
- Reach out to state/local air quality agencies

# Discussion

- What are your thoughts?
- What are your concerns?
- Do you know of citizen monitoring efforts?

*Tim@SonomaTech.com*

*(707) 665-9900*